REMARKS

STATUS OF CLAIMS

Claims 1-6 are pending.

Claims 1, 2 and 6 are rejected under 35 USC 102(b) as being anticipated by Carlsen II (US Patent No. 5,025,473).

Claims 3, 4 and 5 are rejected under 35 USC 103(a) as being unpatentable over Carlsen in view of well known prior art (MPEP 2144.03).

Claims 1 and 3-6 are amended, and new claims 7-13 are added.

Thus, claims 1-13 remain pending for reconsideration, which is respectfully requested.

SPECIFICATION

The Examiner objects to the specification, including the claims and the Abstract, for minor informalities as indicated on pages 2 and 3 of the Office Action. The specification, the claims, and the Abstract, are amended according to the foregoing, taking into consideration the Examiner's comments.

Regarding the Examiner's comment about page 4, line 11, the phrase "the inclination characteristic," in the present Application, the Applicant asserts that the inclination characteristic is a representation of a relationship between a sound pressure and a sound frequency, which is shown as a declining slope of a characteristic curve P1 in FIG. 5. For example, FIGS. 4 and 5 show the relationship between the sound frequency of around 500Hz and greater, and the sound pressure, as represented by the curves P1 and P2 in FIGS. 5 and 4, respectively. See, bridging paragraph on pages 7 and 8.

PRIOR ART

Carlsen

Carlsen discloses an arrangement of divergently mounted acoustic transducers in a hemispherical air tight enclosure, the enclosure being sized with regard to the loading requirements of the acoustic transducers to produce a small size speaker system having an omnidirectional sound radiation pattern and a flat frequency response without the need of a crossover network.

Independent claims 1 and 6 are amended to further emphasize the patentably distinguishing features of the present invention. Carlsen does not disclose or suggest the recitation:

> a correction filter operatively connected to the speakers and increasing sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of the adjacent two speakers (claims 1 and 6).

Support for the claim amendments can be found in page 7, last paragraph, to page 8, first paragraph, and FIGS. 3, 4 and 5. One benefit of the invention is that the flatness of the sound pressure level can be maintained as the frequency varies, so that sound around the entire periphery of the wide-directional loudspeaker can approach an actual sound, improving sound reception (page 10, line 18, to page 12, line 9, of the Application).

The claimed invention is patentably distinguishing over Carlsen as follows:

First, the present invention provides a correction filter in a polyhedron shape speaker set that flattens the sound pressure in relation to increasing sound frequencies at apex positions of adjacent two speakers. Carlsen does not disclose a correction filter. The Examiner asserts that Carlsen discloses omission of a crossover network, thereby suggesting that a crossover network may be used in the speaker, and that a crossover network is well known. However, typically, a crossover network is used to route appropriate frequency ranges to different speaker drivers. In other words, a crossover network functions to divide the input audio spectrum into two or more frequency bands. In contrast, the present invention is directed to providing a correction filter to improve sound quality at apex positions of adjacent two speakers in a polyhedron shape speaker set (see, FIG. 3 of the present Application). In particular, in contrast to Carlsen, the claimed invention provides, "a correction filter ... increasing sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of the adjacent two speakers," which differs in function than a crossover network.

Second, the present invention is directed to eliminating the disadvantage of high frequency attenuation occurrence at apex positions of adjacent two speakers in a polyhedron shape speaker set. According to the Examiner, Carlsen, column 1, lines 42-45, discloses that a spherical speaker system would have nearly perfect omnidirectional radiation qualities (page 4, last paragraph, of the Office Action). However, this Carlsen disclosure appears to be conflicting, or at least confusing, because in column 1, lines 45-50, Carlsen describes that to produce a speaker system which has the maximum frequency response and best omnidirectional pattern one is forced to use different speaker drivers, thus suggesting a need for a crossover network.

Therefore, Carlsen also appears to acknowledge the disadvantage of high frequency attenuation occurrence at apex positions of adjacent two speakers in a polyhedron shape speaker set (see, page 1, last paragraph, to page 2 of the Application). Accordingly, Carlsen provides proper acoustic loading and provides physical damping protection against excessive applied electrical transient pulses (column 2, lines 39-42) without a crossover network. The Examiner acknowledges that Carlsen does not disclose or suggest a crossover network. Carlsen obviates the crossover network based upon a speaker body physical configuration, such as speaker size, positional angles, airtight frame, etc. (column 2, line 39 to column 3, line 58). However, in contrast to Carlsen, the claimed invention provides, "a correction filter ... increasing sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of the adjacent two speakers" (claims 1 and 6).

Third, although Carlsen discloses that a cross-over network is not needed in a polyhedron shape speaker set, this is because the flatness of sound pressure is maintained only along the axial lines of each speaker (i.e., along the frontal surface of each speaker). Therefore, pages 9-10 of the present Application disclose that when the characteristics of the coil speakers are set to maintain the flatness of the sound pressure along the frontal surface of each speaker without a correction filter, the sound pressure can still be substantially maintained along the frontal surface of each speaker even with the correction filter 4, which maintains the sound pressure flatness along the apex positions of the polyhedron speaker system. Therefore, the present invention is directed to maintaining the sound pressure along the frontal surface as well as apex positions of the polyhedron shape speaker set by setting, "characteristics of the coil speakers ... to maintain the flatness of the sound pressure along an axial line of each speaker without a correction filter" (see, dependent new claim 7) and providing, "a correction filter ... increasing sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of the adjacent two speakers." At least, Carlsen and the well known crossover networks do not disclose or suggest the claimed correction filter that increases sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of adjacent two speakers. Therefore, the Examiner's well-known assertions are hereby traversed.

THE CLAIMED INVENTION

The recitation, "to flatten the sound pressures" is represented by flatness of the characteristic curve P2 in FIG. 4 using the "correction filter" of the invention. In particular, by using the "correction filter" of the invention, the curve P2 in FIG. 4 represents a flatness of the

sound pressure at the sound frequency of around 500Hz and over. FIG. 5 shows the relationship between the sound pressure and the increasing sound frequency without the "correction filter" of the invention, in which the curve P1 slope is declining, deteriorating sound perception.

In contrast to Carlsen, amended independent claims 1 and 6 recite, "a correction filter ... increasing sound pressures in relation to increasing sound frequencies to flatten the sound pressures at apex positions of the adjacent two speakers." A benefit of the invention is that even at a place obliquely positioned with respect to the polyhedron speaker, the flat characteristic curve P2 in FIG. 4 can be obtained and hence, high quality sound can be obtained at all the positions around the speaker system.

New dependent claims 7 and 9 recite, "the sound pressure is increased according to a distance from the apex positions of the adjacent two speakers having a maximum inclination characteristic in a relationship between the sound frequency of about 500Hz and greater and the sound pressure, without the correction filter." More particularly, as shown in FIG. 3, the present invention increases the sound pressure as the sound frequency increases at a measured position S1 separated from an apex between the axial lines P of adjacent two speakers 3. The measured position S1 is on a straight line extended from the center of the polyhedron toward the outside of the apex through the apex as shown in FIG. 3. The measured position S1 is a position having a maximum inclination characteristic in a relationship between the sound frequency of around 500Hz and over and the sound pressure, at the time the correction filter is not used. Support for claims 7 and 9 can be found, for example, in page 6, line 23, to page 8, line 22; and page 7, last paragraph, to page 8, first paragraph, and FIGS. 3, 4 and 5, of the Application.

New dependent claims 8 and 10 recite, "characteristics of the speakers are set to maintain the flatness of the sound pressures at a position outside each speaker along an axial line of each speaker without the correction filter." Therefore, according to the invention, characteristics of each speaker is set to maintain the flatness of the sound pressure, in a sate of no correction filter, at a measuring position S2 outside each speaker. The measuring position S2 is a place on the axial line of each speaker as shown in FIG. 7. A benefit is that the flatness of the sound pressure can be secured along the axial line P as well as by using the correction filter along the apex positions of the adjacent two speakers. Support for new claims 8 and 10 can be found, for example, in page 9, line 2, to page 10, line 17 of the Application.

NEW CLAIM 11

New claim 11 provides an alternative recitation of the present invention. In contrast to Carlsen, the present invention provides:

> a correction filter connected to the speakers and setting a correction value according to an attenuation factor based upon the predetermined angle to flatten sound pressures in relation to increasing sound frequencies at apex positions of the adjacent two speakers.

Clearly, Carlsen does not disclose or suggest the claimed invention as recited in new claim 11. Support for the new claim 11 can be found, for example, in page 8, lines 12-22, of the Application. New dependent claims 12-13 are consistent with dependent claims 3-4.

CONCLUSION

In view of the Amendments and the remarks, withdrawal of the rejections of claims 1-6 and allowance of claims 1-6 and new claims 7-13 is respectfully requested.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Respectfully submitted,
STAAS & HALSEY LLP

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By: _____
Mehdi D. Sheikerz
Registration No. 41,307

1201 New York Avenue, NW, Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501